



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/891,511	06/27/2001	Mamoru Nakasuji	010819	8779
23850	7590	10/03/2003	EXAMINER	
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP 1725 K STREET, NW SUITE 1000 WASHINGTON, DC 20006			BERMAN, JACK I	
			ART UNIT	PAPER NUMBER
			2881	

DATE MAILED: 10/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/891,511	NAKASUJI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jack I. Berman	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) 17-59 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \*   c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 6-9, 11, 15, 16, and 60 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,665,968 to Meisburger et al. Meisburger et al. discloses an inspecting apparatus for inspecting an object to be inspected by irradiating charged particles onto said object to be inspected, said apparatus comprising: a working chamber for inspecting said object to be inspected, said chamber capable of being controlled to have a vacuum atmosphere (see the section labeled VACUUM SYSTEM beginning at line 52 in column 19); a beam generating means for generating said charged particles as a beam (see lines 14-23 in column 9); an electronic optical system for guiding and irradiating said beam onto said object to be inspected held in said working chamber, detecting secondary charged particles emanated from said object to be inspected and introducing said secondary charged particles to an image processing system (see lines 23-64 in column 9); said image processing system for forming an image by said secondary charged particles (see sections labeled VIDEO FRAME BUFFER and IMAGE DISPLAY in column 18); an information processing system for displaying and/or storing status information of said object to be inspected based on output from said image processing system (see the sections labeled DEFECT PROCESSOR in column 14 and POST PROCESSOR in column 18); a stage unit (24) for operatively holding said object to be inspected

so as to be movable with respect to said beam; a carrying mechanism for securely accommodating said object to be inspected and for transferring said object to or from said working chamber (see sections labeled SUBSTRATE HANDLER in column 19 and LOAD OPERATION starting in column 20); an alignment controller for observing the surface of said object to be inspected for the alignment of said object to be inspected with respect to said electron-optical system to control the alignment (see section labeled ALIGNMENT COMPUTER in column 16) wherein the alignment of said object to be inspected includes rough alignment performed within said mini-environment space (see lines 7-25 in column 19) and alignment in XY-directions and alignment in a rotating direction performed on said stage device (see lines 26-37 in column 19 wherein the alignment in a rotating direction is performed by rotating the beam scan); and a laser interferometry range finder for detecting coordinates of said object to be inspected on said stage device, said coordinates of said object to be inspected being determined by said alignment controller using patterns formed on said object to be inspected (see section labeled INTERFEROMETERS in column 17); an E x B separator (Wien filter deflectors 112 and 113), having an electric field and a magnetic field crossing at right angles, into which said charged particles and said secondary charged particles enter, said secondary charged particles being advanced in a direction approximately opposite to said charged particles, and in which said charged particles or said secondary charged particles are deflected selectively, said E x B separator characterized in that: the electrodes (112) for generating an electric field are made up of three or more pairs of non-magnetic conductive electrodes, and are arranged so as to approximately form a cylinder ( see lines 31-45 in column 11); an electrode (107) for controlling the electric field intensity in a plane of said sample to be inspected, and thereby uniforming a distribution or reducing the potential level of electric charge residing on said object, said plane

being exposed to said electron beam irradiation, said electrode being arranged between said objective lens and said sample to be inspected and having a shape approximately symmetrical with respect to the optical axis of irradiation of said beam (see lines 54 in column 12 through line 4 in column 13); an image obtaining means for obtaining respective images for a plurality of regions to be inspected, said regions being displaced from one another while being partially superimposed one on another on said sample; a storage means for storing a reference image; and a defect determination means for determining any defects in said sample by comparing said respective images obtained by said image obtaining means for said plurality of regions to be inspected with said reference images stored in said storage means (see section labeled DEFECT PROCESSOR beginning in column 14). Meisburger et al. also teaches to use this apparatus to inspect an object to detect defects on a wafer "in a production environment", i.e. in the middle of a process or subsequent to the process (see line 49 in column 3 through line 13 in column 4).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meisburger et al. in view of Davis et al. and Lo et al. Meisburger et al. does not discuss the problem of dust adhering to a wafer as the loading chamber is evacuated. Davis et al. discusses this problem at line 64 in column 10 through line 31 in column 11 and teaches that it occurs whenever wafers are transferred into a vacuum chamber through a loading chamber and further teaches to solve it by supplying a clean gas to the wafer. It would have been obvious to a person having ordinary skill in the art to apply Davis et al.'s solution to this problem, which would inherently occur in the Meisburger et al. apparatus discussed above, by using Meisburger et al.'s loadlock subsystem as a mini-environment chamber for supplying a clean gas to said object under testing to prevent dust from attaching to said object under testing. Davis et al. also teaches, at lines 20-27 in column 23, that any number of load lock chambers and processing modules and transfer arms can be provided to deliver wafers between any two chambers in any sequence if desired. The provision of a plurality of loading chambers disposed between the mini-environment chamber discussed above and the testing chamber, each adapted to be independently controllable in a vacuum atmosphere, a first transport unit for transporting an object under testing between one of the loading chambers and the mini-environment chamber, and a second transport unit for transporting said object under testing between one of said loading chambers and said testing chamber would therefore have been an obvious duplication of parts in accordance with Davis et al.'s suggestion. Lo et al. discloses scanning electron beam inspection apparatus similar to Meisburger et al.'s and teaches, at lines 48-53 in column 7, to provide a vibration isolator (50) for preventing vibrations of the object under testing. It would have been

obvious to a person having ordinary skill in the art to provide this device in the Meisburger et al. apparatus because vibrations would be as detrimental to image resolution in the Meisburger et al. apparatus as they would be in the Lo et al. apparatus and some means would have to be provided to maintain the vacuum required by both patented apparatuses.

Claims 4, 10, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meisburger et al. in view of Lo et al. Meisburger et al. does not teach how the object under test to precharge the object under test. Lo et al. discloses scanning electron beam inspection apparatus similar to Meisburger et al.'s. At lines 37-55 in column 6, Lo et al. discloses a precharge unit comprising a charged particle irradiating section (36) for irradiating low voltage electrons in advance against said inspecting region just before the inspection and, beginning at line 48 in column 9, explains in detail how precharging removes variations of charge accumulated on an object under test. It would have been obvious to a person having ordinary skill in the art to apply this teaching of Lo et al.'s to the Meisburger et al. apparatus by providing Lo et al.'s charged particle irradiating section in order to prevent the problems discussed by Lo et al. It would also have been obvious to such a person to perform this precharging while the sample on the stage was still being moved into the desired position in the vacuum chamber in order to save time.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meisburger et al. in view of Petric. Petric discloses an XY stage (30) supported by a hydrostatic bearing (Petric describes it as an air bearing at lines 10-15 in column 8) in a non-contact and with a differential exhausting mechanism (20) arranged surrounding a portion in said charged particle beam apparatus where the charged particle beam is to be irradiated against a surface of said sample, so that a region on said sample to which said charged particle beam is to be irradiated may be

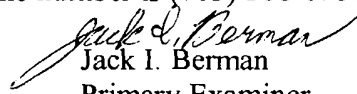
exhausted to vacuum. It would have been obvious to a person having ordinary skill in the art to use the Petric apparatus as the stage positioning equipment and evacuation devices in the working chamber of the Meisburger et al. inspection apparatus since the Petric apparatus is designed to permit the irradiation of objects with a focused electron beam of the type used by Meisburger et al. with a minimum amount of pumping.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Noguchi et al. discloses an inspection apparatus having a plurality of independently controllable vacuum chambers between a loading area and an inspection area and a means to rotate the sample stage.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack I. Berman whose telephone number is (703) 308-4849. The examiner can normally be reached on M-F (8:30-6:00) with every second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (703) 308-4116. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
Jack I. Berman  
Primary Examiner  
Art Unit 2881

jb  
September 25, 2003